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Castniidae (Lepidoptera) in the collection of the Museum and Institute of Zoology Polish Academy of Sciences in Warsaw

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Abstract: The material representing 14 species and subspecies belonging to the Castniidae (Lepidoptera) deposited in the Museum and Institute of Zoology Polish Academy of Sciences in Warsaw was studied. A brief comment on the history of the Museum is provided. General comments on natural history, distribution, and other details are presented for each mentioned species and subspecies.

Key words: Lepidoptera, Giant Butterfly moths, Castniidae, South America, Biodiversity, Neotropics.

INTRODUCTION

The Museum and Institute of Zoology Polish Academy of Sciences in Warsaw has a long, intricate history. By the second half of the eighteen century, a project of developing a public natural history museum in Warsaw was presented twice to the Commission of National Education, and even though it counted on approval, it could not be built due to lack of funds (Wąsowska & Winiszewska-Ślipińska 1996). In 1819, after buying the zoological collection of Baron Sylwiusz Minckwitz from Gronowice, Silesia, the Commission for Religion and Public Education founded the Zoological Cabinet at the Chair of Zoology of the Royal University of Warsaw and hosted it in the Casimirus Palace (Kazubski 1996, Wąsowska & Winiszewska-Ślipińska 1996).

The Cabinet played a relevant role in popularizing scientific advancement in Warsaw, and its personnel was involved in studying the fauna of the city and surrounding areas, but a few were also able to travel abroad to collect material (Luniak & Pisarski 1994, Mierzwa-Szymkowiak & Breure 2017). However, under Russian rules, the activities of the Polish personnel were limited; and by the early 20th century, the Cabinet's relevance diminished considerably (Kazubski 1996). During this time also, significant material, such as Types were sent to Russia, many even burnt. The Russians agreed to return those left after the restoration of the Polish State. By 1921, the Cabinet name changed to Polish State Museum of Natural History – Zoological Department. The importance of the Museum was re-established and its status improved after the President of the Polish Republic changed its name to State Zoological Museum in 1928 (Kazubski 1996, Wąsowska & Winiszewska-Ślipińska 1996).

Through purchases and donations, the Museum increased and diversified its holdings until 1935 when a fire broke out in the Museum destroying part of the building and some collections (Wąsowska & Winiszewska-Ślipińska 1996). The remnant collections were later located in a new building. Also in 1944, the museum suffered a new lost during the Germans' operation to eliminate Warsaw when most of the city was destroyed (Wąsowska & Winiszewska-Ślipińska 1996, Włodzimierz 2006). Half of the museum was damaged by fire and over two million insect specimens, including all of the Neotropical ones, were burnt.

After the Second World War, and thanks to multiple subventions and donations, the Museum returned to scientific activities; and by 1952, when the Polish Academy of Sciences was stablished, the Zoological Institute of the Academy of Sciences was founded and incorporated as the State Museum (Kazubski 1996, Razowski 2000). With lows and highs, the Museum continued its activities in Education; and by 1992, it changed its name to Museum and Institute of Zoology, a name that properly reflects its current functions (Kazubski 1996).

The insect collection is now located in a functional building, and even though some insects are still kept in old wood cabinets, a more modern system has been built to also host them (Figs. 1-2). The Lepidoptera collection includes nearly 600.000 specimens (butterflies and moths); therefore, it is one of the largest research collections at the Museum (D. Mierzwa-Szymkowiak, pers. comm.).

Among the Lepidoptera holdings, there is a small collection of the family Castniidae: 35 specimens that belong to 14 species and subspecies. They are all included in the neotropical sub-family Castniinae, which contains about 88 species that are either diurnal or crepuscular, distributed from Mexico throughout Central America, south to Argentina and Chile (González & Cock 2004, Miller 1986, Moraes & Duarte 2014).

With this work, we continue our efforts to list poorly known Lepidoptera holdings from different Polish Museums (see Domagała *et al.* 2015, 2017, González *et al.* 2013a, 2013b). We follow Miller (1995) and Lamas (1995) in naming the species and the phylogenetic arrangement; however, for genera, except for *Amauta*, we follow Moraes & Duarte (2014). The species are ordered alphabetically, and are followed by the information originally provided on the labels of the studied specimen. We also add details on natural history comments or historical background on the species or some of the specimens examined. All data from the labels is presented maintaining the writing styles of the collectors/curators, and it is complemented with information added by the authors and included within square brackets.

Fig. 1. View of the Mammals collection of the Museum and Institute of Zoology PAS, Warsaw. To the left, in the back, old fashioned wood cabinets can be observed. (photo P. Domagała).

Fig. 2. Insect Collection of the Museum and Institute of Zoology PAS, Warsaw. To the left the old wood cabinet can be observed. A set of modern cabinets were installed to the always increasing collection and can be observed to the right. (photo P. Domagała).

MATERIAL AND METHODS

This work is based on the study of dried and mounted specimens of Castniidae deposited at the Museum and Institute of Zoology, PAS, Warsaw.

The archives and curators of the Museum were also consulted in an effort to understand the information and other details from the labels. Labels with the codes MIZ 86732 and MIZ 86733 are part of a consecutive number inventory system that has been long abandoned. There is no available data in archives about the origin of those specimens. Specimens with the code 19/46 were originally in the collection of Friedrich Kessel from Cieplice, Poland, which was brought to the museum by staff members, malacologist Dr Stanisław Feliksiak (1906-1992) and entomologist Dr Janusz Nast (1908-1991). This was part of the original Museum collection kept in that town for safekeeping during WWII.

Specimens with code number 50/47 were confiscated from Mr. Julius Stephan by the Special Commission for Combating Economic Fraud and Wrecking, and were donated in 1947 to the museum. The code numbers 107/49 appear in the labels of specimens from a collection donated in 1949 by the Regional Museum from Nowa Sól, Poland. Moths with the code numbers 108/49 were part of Dr Eugen Krüger's collection, which was also donated in 1949 by the State Gymnasium from Lwówek Śląski, Poland. Specimens with the code 51/50 were part of a collection donated by the Faculty of Zoology S.G.G.W. University, Warsaw (Warsaw University of Life Sciences). Lastly, specimens with the code 96/51 were part of Prof. A. Górga's collection from Zalesie Dolne (near Warsaw) which was purchased by the museum.

RESULTS

Annotated list of examined species and subspecies

Castniidae Blanchard, 1840

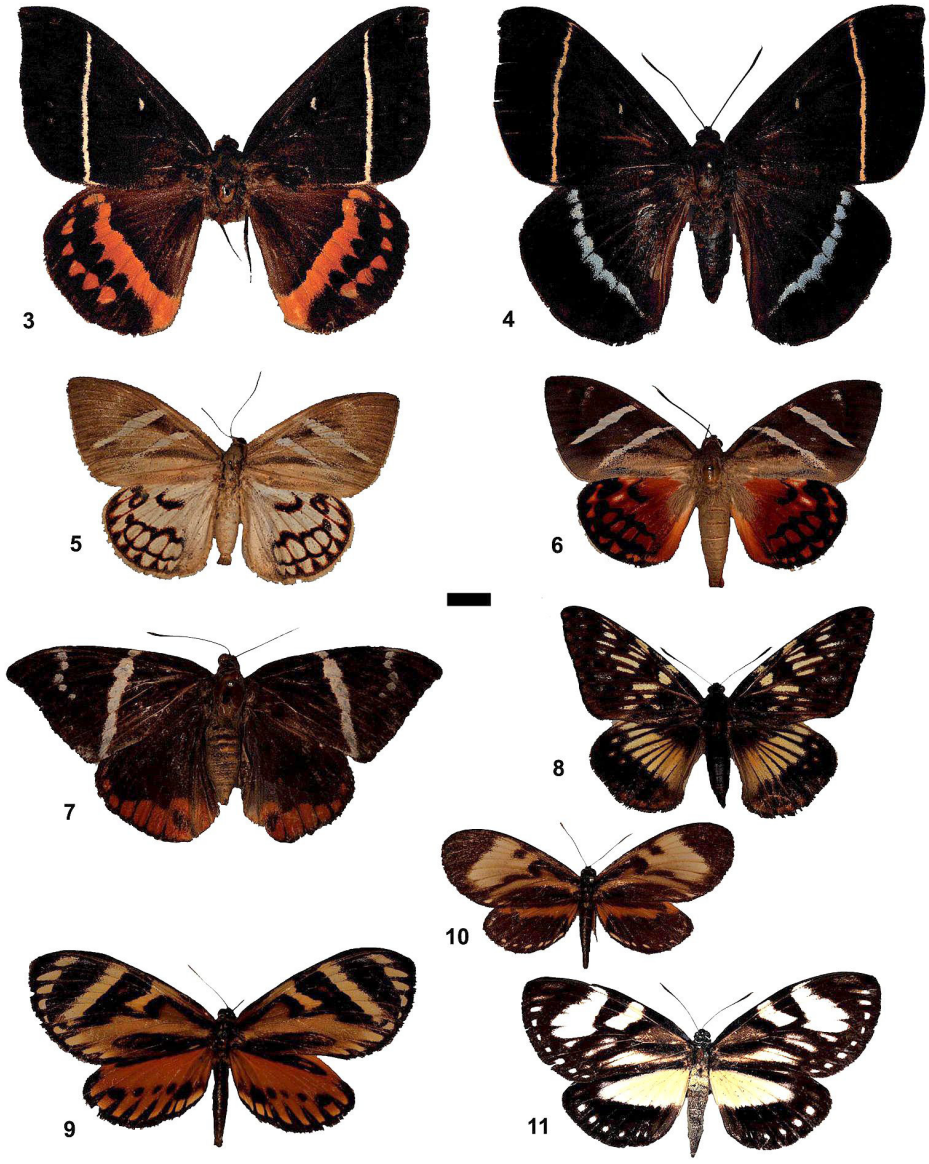
Castniinae Blanchard, 1840

Castniini Blanchard, 1840

Amauta cacica procera (Boisduval, [1875]) (Fig. 3)

Material examined: 1♀, *Castnia cacica*, Chiriqui, Panama, 107, Mus. Zool. Polonicum Warszawa, 96/51.

Comments: This subspecies has a geographic range that includes Mexico and Central America down to Panama (González 2008, González & Stüning 2007, Lamas 1995, Miller 1986). Not many specimens with adequate data are known (González & Stüning 2007, González *et al.* 2013a, Miller 1986, Miller & Sourakov 2009). Even though there is not much information on their biology and natural history, adults have been observed in Costa Rica feeding on flowers of *Heliconia pogonantha* Cuf. (Heliconiaceae), a possible larval host plant (Miller & Sourakov 2009).



Figs. 3–11. **3**. Female *Amauta cacica procera* (Boisduval), Chiriqui, Panama; **4**. Female *Amauta papilionaris velutina* (Houlbert), Ecuador; **5**. Male *Castnia invaria penelope* Schaufuss, "white morph," Brazil(?); **6**. Male *Castnia invaria penelope* Schaufuss, Brazil(?); **7**. Male *Telchin syphax* (Fabricius), Brazil(?); **8**. Male *Geyeria galinthias* (Hopffer), Sao Paulo, Brazil; **9**. Male *Prometheus simulans* (Boisduval), Susumuco, Cundinamarca, Colombia; **10**. Male *Prometheus ecuadoria truxilla* (Westwood), Susumuco, Cundinamarca, Colombia; **11**. Female *Prometheus personata daguana* (Preiss), Yacula, Nariño, Colombia. Scale: 10 mm. (photos A. Larysz).

Amauta papilionaris velutina (Houlbert, 1917) (Fig. 4)

Material examined: 1♂, *Castnia velutina* Houlb. ♀, Mus. Zool. Polonicum Warszawa, 96/51; 1♂, *Castnia papilionaris* ♀, S. America, Ecuador; 1♂, [no data], *papilionaris*, Mus. Zool. Polonicum Warszawa, 50/47.

Comments: This subspecies can be somehow easily separated from the other ssp. and was originally described (as *Castnia velutina*) from Macas, Ecuador (Houlbert 1917, 1918). It is unfortunate that most specimens known from several museums lack adequate data (Miller 1986, González *et al.* 2013b), and in the case of the three examined specimens it is no different. Even though only one of the specimens specifically mentions Ecuador as country of origin, we believe that the other two come from the same country.

Imara pallasia (Eschscholtz, 1821)

Material examined: 1♀, [no data], Mus. Zool. Polonicum Warszawa, 96/51.

Comments: This species seems to be restricted to cloud forests of southeastern Brazil where it flies with the closely related *Imara satrapes* (Kollar) (González & Stüning 2007, Miller 1986). The species appears to be a visual mimic of *Parides ascanius* (Cramer) (Papilionidae) and it has been also observed hilltopping with a couple of *Morpho* spp. and other Nymphalidae (Miller 1986).

Imara satrapes (Kollar, 1839)

Material examined: 1♂, *Castnia satrapes*, Candido de Abreu, [Paraná, Brazil], 20.XII. [19]27, MIZ 86732; 1♂, Pelotas, 19.Jan[uary]. 1964, R.[io] G.[rande] do Sul, Brasil, Lucia Mantovani – Biezanko leg., *Castnia satrapes* Kollar, C. Biezanko det.; 2♂♂, Santa Rosa, Rio Grande do Sul, 9.02.[19]55, Brazylia, A. Longwinski.

Comments: A species commonly found in southeastern Brazil in the same areas where *I. pallasia* flies; however, it has been also reported from Paraguay and Argentina (González & Stüning 2007, Penco 2011, Ríos & González 2010). Some terrestrial and epiphytic bromeliads (Bromeliaceae) have been mentioned as hosts (Biezanko 1961b, Miller 1986, Penco 2011, Ríos & González 2011).

Synpalamides fabricii (Swainson, 1823)

Material examined: 1♂, *C. boisduvali*[sic], II.[19]34, S.[ao] Paulo, [Brazil].

Comments: Highly variable species distributed in south/southeast Brazil, where it flies with the similar *S. hegemon* (Kollar) (Moraes *et al.* 2010, Penco 2011). It has been associated with epiphytic bromeliads and reported feeding on *Tillandsia* sp. (Bromeliaceae) (Enslen 1920, Biezanko 1961b, Miller 1986).

Synpalamides phalaris (Fabricius, 1793)

Material examined: 2♂♂, [no data], Mus. Zool. Polonicum Warszawa, 19/46; 1♂, 1♀, illegible, 12, II, [19]25, Mus. Zool. Polonicum Warszawa, 19/46.

Comments: A highly variable species distributed in Venezuela, Trinidad, East and Southern Brazil, Uruguay, Paraguay, and the provinces of Formosa and Misiones in northeast

Argentina (González & Cock 2004, González & Worthy 2017, González *et al*. 2013b, Penco 2011, Ríos & González 2011). It is associated with terrestrial and epiphytic bromeliads including pineapples (Bromeliaceae) and larvae have been reported boring in rhizomes of bananas (Musaceae) (Jörgensen 1930, Miller 1986, Penco 2011, Ríos & González 2011). They fly high at 8-15 m above ground from 10 a.m. to 12 p.m. from October to November and January to February in Brazil and Paraguay (Biezanko 1961a, Miller 1986, Ríos & González 2011).

Synpalamides rubrophalaris (Houlbert, 1917)

Material examined: 1♂, *Castnia* sp., Candido de Abreu, [Paraná, Brazil], 23.XI.[1927], MIZ 86733; 1♂, Candido de Abreu, [Paraná, Brazil], 25.XI.[19]27.

Comments: Found in Brazil, Paraguay and Argentina (Misiones) (Penco 2011, Ríos & González 2011). However, a specimen in the Natural History Museum, London, bears a label stating that it was collected in Venezuela (Joicey & Talbot 1925, Lamas 1995, Miller 1986, 1995). Its hosts are unknown, but the species has been collected in Atlantic forests throughout its geographic range (Miller 1986, Ríos & González 2011). Specimens have been observed perching on leaves of bushes or small size plants (Ríos & González 2011).

Castnia invaria penelope Schaufuss, 1870 (Figs. 5-6)

Material examined: 1♂, [no data], [white morph], Mus. Zool. Polonicum Warszawa, 96/51 (Fig. 5); 1♂, [no data], Mus. Zool. Polonicum Warszawa, 96/51 (Fig. 6).

Comments: This is also a highly variable subspecies with several "color" morphs known to occur together (Jordan 1906, González & Stünning 2007). One of the specimens in the Museum is a "white morph", similar to the one illustrated by Jordan (1906) and González & Stünning (2007) while the other is a typical one. Some authors treat the "white morph" as *C. endelechia* after Druce (1893) (i.e. Penco 2011), however we prefer to follow Lamas (1995) after a thorough review determines that such "white morphs" are valid and separate species. The species is widely distributed in Brazil, south of the Amazon River, and reaches Bolivia, Paraguay and Argentina (González & Stüning 2007, Penco 2011). It has been reported feeding on pineapples and other terrestrial bromeliads (Bromeliaceae) (González & Stüning 2007, Miller 1986, Pastrana 2004, Penco 2011).

Telchin licus (Drury, 1773)

Material examined: 1♀, [no data], Mus. Zool. Polonicum Warszawa, 96/51; 1♀, [no data], Mus. Zool. Polonicum Warszawa, 96/51; 1♂, [no data], Mus. Zool. Polonicum Warszawa, 107/49; 1♂, [no data], Mus. Zool. Polonicum Warszawa, 107/49.

Comments: A very common, widespread and variable species in South and Central America, known as a pest of sugar-cane (*Saccharum officinarum* L.: Poaceae) and sometimes of bananas (*Musa* spp.: Musaceae) (González & Fernández Yépez 1993, González & Stüning 2007, González *et al.* 2013a, 2013b). The taxonomy of the associated subspecies is very confusing and many specific and subspecific epithets have been described in this group (Miller 1986, 1995). Silva-Brandão *et al.* (2013) were able to at least elucidate some of the Brazilian subspecies after molecular studies. Unfortunately, the origin of the three specimens in the museum is unknown.

Telchin syphax (Fabricius, 1775) (Fig 7)

Material examined: 1♂, *Syphax*, Tranquebar, Mus. Zool. Polonicum Warszawa, 51/50; 1♂, *Castnia syphax*, So.[uth] Amer.[ica], Mus. Zool. Polonicum Warszawa, 96/51.

Comments: A widely distributed species South of the Orinoco River to the lower Amazon and to the Guianas and up to Trinidad, but not known north of the Orinoco River in mainland South America (González 1999, González & Cock 2004). At least a specimen is known to us from "Bogotá, Colombia" (González & Salazar 2003). Such locality was frequently used as origin of many species sent from that South American country to museums worldwide, thus the specimen was possibly collected at a southern Colombian locality (González *et al.* 2013c). Even though this is a rather common species in its distribution area, virtually nothing is known about its ecology and biology. One of the specimens at the museum bears a label that reads "*Syphax*, *Tranquebar*". The latter is the former name of Tharangambadi, a town in the State of Tamil Nadu in the South of India. Such locality for any Castniinae is certainly erroneous.

Geyeria galinthias (Hopffer, [1854]) (Fig. 8)

Material examined: 1♂, *C. galinthias* ♂, II.[19]33, S.P. [Sao Paulo, Brazil].

Comments: This beautiful Castniinae is easily recognized due to its very distinctive forewing maculation (Miller 1986). The species appears to be distributed only in southeast Brazil where it flies from November to early January, but nothing is known about its natural history (Miller 1986).

Gazerini Houlbert, 1918

Prometheus simulans (Boisduval, [1875]) (Fig. 9)

Material examined: 1♂, Susumuco, [Cundinamarca, Colombia], ♀, 3/9/ [19]14, 40, O K Dpt. [Osten Kundinamarka Department?], Mus. Zool. Polonicum Warszawa, 108/49; 1♂, *K. sim*. [*Kastnia*(sic) *simulans*] ♂, Susum.[uco, Cundinamarca, Colombia] 27/7 [19]15, 51 O K D [Osten(east) Kundinamarka Department?], *Castnia simulans* Bsd., Mus. Zool. Polonicum Warszawa, 108/49.

Comments: This species was originally described from Colombia, but it has been found in several South American localities from Venezuela, Colombia, Ecuador, Bolivia and western Amazonas in Brazil (González 1997, González & Fernández Yépez 1993, Hernández-Baz *et al*. 2012, Miller 1986). This is one of several species of Castniidae that are part of mimetic rings that include Heliconidae and Ithominae butterflies (Miller 1986). These and all the museum specimens in the Gazerini (see below) were collected by Dr. Eugen Krüger. Not much is known about Krüger, but he was possibly a German geologist with a keen interest in Lepidoptera who published several articles mainly on butterflies even describing quite a few of them (Pyrcz 1999a, 1999b, 2004). He travelled to South America and some Caribbean islands and was in contact with dealers/researchers such as Friedrich Niepelt (1862-1936) and George Talbot (1882-1952) (Pyrcz 2004). Nothing is known about what happened to him after 1933, and how his collection was deposited in the State Gymnasium in Lwówek Śląski. In 1949, 44 drawers with his reference collection containing many types were donated to the Polish Academy of Sciences and deposited at the Museum where they still are preserved (Pyrcz 2004).

Prometheus ecuadoria truxilla (Westwood, 1877) (Fig. 10)

Material examined: 1♂, Susum[uco] [Cundinamarca, Colombia] ♂, 3/9/ [19]14, 33, C K dept. [Central Kundinamarka Department], Mus. Zool. Polonicum Warszawa, 108/49, *Castnia pellonia* Druce; 1♀, Susumuco [Cundinamarca, Colombia] ♀, 23/4 [19]14, 48, 900, O K Dpt. [Osten Kundinamarka Department?], Mus. Zool. Polonicum Warszawa, 108/49; 1♀, *K. truxilla* ♀, Susum[uco] 42, 28/215, O K D [Osten Kundinamarka Department?], Mus. Zool. Polonicum Warszawa, 108/49.

Comments: This subspecies could be considered a mime of certain *Heliconius* [*H. numata* (Cramer , 1780)?] or even some *Melinaea* butterflies (Nymphalidae) (Miller 1986). There is no doubt that the museum specimens were collected by Krüger, as his writing is clearly noticed in the labels. The dates and information in the labels match his first trip to Colombia (Pyrcz 2004).

Prometheus personata daguana (Preiss, 1899) (Fig. 11)

Material examined: 1♀, Yac[ula] 500 [Nariño, Colombia], ♀, 26/5 224, yuz.[?], Muz. Zool. Polonicum Warszawa, 108/49; 1♂, Yac[ula] 500 [Nariño, Colombia], ♂, 2/5 [19]27 1, yuz.[?], Muz. Zool. Polonicum Warszawa, 108/49; 1♀, Yac[ula] 500 [Nariño, Colombia], ♀, 31/5 [19]27 11, yuz.[?], Muz. Zool. Polonicum Warszawa, 108/49; 1♂, Yac[ula] 500 [Nariño, Colombia], ♂, 2/6 [19]27 11, yuz.[?], *Castnia linoides* spec. nov., Muz. Zool. Polonicum Warszawa, 108/49; 1♂, Yac[ula] 500 [Nariño, Colombia], ♂, 5/6/ [19]27, 43, yuz.[?], Muz. Zool. Polonicum Warszawa, 108/49.

Comments: The collector of these five specimens is certainly Eugen Krüger. The dates and localities match his second visit to Yaculá, Nariño, Colombia, from late January to late July, 1927 (Pyrcz 2004). It is also interesting that the specimens, even though they are all the same subspecies, show slight phenotypical differences among them, a characteristic of many Castniidae which has allowed for the description of many supposed subspecies (González *et al.* 2010, Miller 1986, Moraes *et al.* 2010). As in many Castniidae not much is known about the natural history of this subspecies.

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